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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR    | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/531,823      | 04/18/2005  | Francis Anthony Darmann | 40121/01101         | 3945             |

7590

05/04/2006

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| EXAMINER |
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BAUER, SCOTT ALLEN

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| ART UNIT | PAPER NUMBER |
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2836

DATE MAILED: 05/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

11A

|                              |                        |  |                     |  |
|------------------------------|------------------------|--|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> |  | <b>Applicant(s)</b> |  |
|                              | 10/531,823             |  | DARMANN ET AL.      |  |
|                              | <b>Examiner</b>        |  | <b>Art Unit</b>     |  |
|                              | Scott Bauer            |  | 2836                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 15-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 15-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 April 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. ____   |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>4/18/05 &amp; 12/27/05</u>  | 6) <input type="checkbox"/> Other: ____                                     |

## **DETAILED ACTION**

### ***Specification***

1. The disclosure is objected to because of the following informalities: In Line 2 of Paragraph 4 "Fig. 1" should be changed to --Fig. 2--. Appropriate correction is required.
2. The specification is further objected to because it provides no support for Claim 28.

### ***Drawings***

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the current limiter comprising a plurality of iron cores, that includes at least one iron core with an air gap and one continuous iron core, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate

changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

#### ***Claim Objections***

4. Claims 24 & 28 are objected to because of the following informalities:
5. In Claim 24, the word --during-- should be inserted in Line 4 between the word "current" and "a".

In Claim 28, the word "has", in line 5, should be removed.

Appropriate correction is required.

6. Claim 28 is objected to as failing to comply with the written description requirement. The claim contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification does not disclose that the invention can be a multiphase

device comprising a plurality of iron cores wherein one core has an air gap and another core is solid and continuous.

***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 15-17 are rejected under 35 U.S.C. 102(b) as being anticipated by Joo et al. (US 5,930,095).

9. With regard to Claim 15, Joo et al., in Figure 8, discloses a superconducting current limiting device, comprising: an interconnected high magnetic permeability structure (88) including a central core (83b) coupled to at least a first arm (83A) and a second arm (83C) branching off therefrom; a superconductive coil (84) surrounding the central core (83B) for biasing the central core; a first alternating current coil (82) surrounding the first arm (83A) and coupled to an alternating current source (80); and a second alternating current coil (86) surrounding the second arm (83C) and coupled to an alternating current load (81), wherein the first and second alternating current coils are magnetically coupled to the central core (column 7 lines 63-67 & column 8 line 1), the device limiting the current passing through the device upon an occurrence of a fault condition in the load (column 8 lines 8-16).

10. With regard to Claim 16, Joo et al., in Figure 8, discloses the device according to claim 15, wherein each of the first and second arms (83a & 83b respectively), substantially form a loop which couples a first end and a second end of the central core.

Two separate loops are formed in the magnetic core (88). A loop exists between each leg and the central core.

11. With regard to Claim 17, Joo et al., in Figure 8, discloses the device according to claim 16, wherein each of the loops includes a first portion and a second portion, the first and second portions being separated by an air gap (column 7 lines 53-56).

The loops of Fig. 8 each comprise an upper portion and a lower portion wherein the air gap of the central core separates each section.

12. Claims 15-21 & 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Parton et al. (US 4,045,823).

13. With regard to Claim 15, Parton et al., in Figure 4, discloses a superconducting current limiting device, comprising: an interconnected high magnetic permeability structure (12A & 13A) including a central core (the legs of 12A & 13A inside the loop 20) coupled to at least a first arm (the leg with coil 10A) and a second arm (the leg surrounded by by coil 11A) branching off therefrom; a superconductive coil (20) surrounding the central core for biasing the central core column 1 lines 21-37); a first

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alternating current coil (10A) surrounding the first arm and coupled to an alternating current source; and a second alternating current coil (11A) surrounding the second arm and coupled to an alternating current load (column 3 lines 55-59), wherein the first and second alternating current coils are magnetically coupled to the central core (via lines of flux  $\Phi A1$   $\Phi A2$ ), the device limiting the current passing through the device upon an occurrence of a fault condition in the load (column 1 lines 8-20).

14. With regard to Claim 16, Parton, in Figure 4, discloses the device according to claim 15, wherein each of the first and second arms substantially form a loop which couples a first end and a second end of the central core.

15. With regard to Claim 17, Parton, in Figure 4, discloses the device according to claim 16, wherein each of the loops includes a first portion (12A) and a second portion (13A), the first and second portions being separated by an air gap (the space between the two cores).

16. With regard to Claim 18, Parton, in Figure 4, discloses the device according to claim 15, wherein the structure is composed of an iron core (column 1 lines 21-24), which is a ferrous material.

17. With regard to Claim 19, Parton, in Figure 4, discloses the device according to claim 15, wherein a first cross-sectional width of a first high magnetic permeability

material forming the core is substantially twice a second cross-sectional width of a second high magnetic permeability material forming the arms. Figure 4 discloses that the central core comprises two legs while the outer arms each comprise only one. In this configuration, the central core would necessarily have a central core with a cross section that is substantially twice a cross section width of the arms.

18. With regard to Claim 20, Parton, in Figure 4, discloses the device according to claim 15, wherein the superconductive coil (20) is adjacent to the central core.

19. With regard to Claim 21, Parton, in Figure 4, discloses the device according to claim 16, wherein the central core area is substantially between one and two times an outer limb area as discussed above in Claim 19.

20. With regard to Claim 23, Parton, in Figure 4, discloses a multiphase superconducting current limiter device, comprising: a central core (the portion of 12 & 13 inside the loop 20) composed of a high magnetic permeability material; a superconductive coil (20) surrounding the central core for biasing the central core; a first plurality of alternating current phase coils (10), each of the first plurality of coils being coupled to a phase of an alternating current source; and a second plurality of alternating current coils (11) coupled to a phase of at least one alternating current load, wherein the first and second plurality of coils are magnetically coupled to the central core, the device



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limiting a current passing through the device upon an occurrence of a fault condition in one of the source and the load (column 1 lines 8-37).

21. Claims 24 & 25 are rejected under 35 U.S.C. 102(b) as being anticipated by Murphy (US 4,336,561).

22. With regard to Claims 24 & 25, Murphy discloses a multistage superconducting fault current limiter device, comprising: a first superconducting fault current limiter limiting a current during a first portion of a transient fault; and a second superconducting fault current limiter limiting the current a second portion of the transient fault wherein the first portion includes an initial portion of the transient fault and the second portion includes a steady state portion of the transient fault (column 2 lines 16-30 & column 10, lines 43-50).

23. Claims 26 & 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Parton (US 4,117,524).

24. With regard to Claim 26, Parton, in Figure 4, discloses a multiphase superconducting current limiter device, comprising: a single one superconducting coil (20), and a single one cryostat (column 4 lines 4-7), which would inherently require a cryocooler.

25. With regard to Claim 27, Parton, in Figure 4, discloses a DC saturated superconducting current limiter device, comprising: an iron core (12 & 13) including at least one air gap (the empty space between the two cores).

***Claim Rejections - 35 USC § 103***

26. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

27. Claims 15 & 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Neumuller et al. (PCT/DE01/02550) in view of Joo et al. (US 5,930,095).

It is noted that any citation of column and page numbers of the Neumuller reference are made in regard to the English language equivalent (US 6,795,282).

28. With regard to Claim 15, Neumuller et al. teaches a superconducting current limiting device, comprising: an interconnected high magnetic permeability structure (6) including a central core (6c) coupled to at least a first arm (6a) and a second arm (6b) branching off therefrom; a superconductive coil (7) surrounding the central core for biasing the central core; a first alternating current coil (4) surrounding the first arm (6a); and a second alternating current coil (5) surrounding the second arm (6b), wherein the first and second alternating current coils are magnetically coupled to the central core,

the device limiting the current passing through the device upon an occurrence of a fault condition in the load (column 5 lines 17-30).

Neumuller does not teach that the first arm is coupled to an alternating current source or that the second arm is coupled to an alternating current load.

Joo et al., in Figure 8, teaches that a primary and secondary winding can be connected to a source and load respectively.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Neumuller et al. with Joo et al., by connecting the primary and secondary windings taught by Neumuller et al. to the source and load taught by Joo et al., for the purpose of preventing an over current conduction in a distribution network.

29. With regard to Claim 16, Neumuller et al. in view of Joo et al. discloses the device according to Claim 15. Neumuller further discloses that the first and second arms substantially form a loop, which couples a first end and a second end of the central core.

30. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Neumuller et al. in view of Joo et al. as applied to claim 16 above, and further in view of Spreen (US 5,155,676).

31. With regard to Claim 17, Neumuller et al. in view of Joo et al. discloses the device of Claim 16.

Neumuller et al. in view of Joo et al. does not teach an air gap.

Spreen, in Figure 1d, teaches an E-core wherein an air gap is positioned in a center leg of the core with two loops wherein each of the loops includes a first portion and a second portion, the first and second portions being separated by an air gap.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Neumuller et al. in view of Joo et al. with Spreen, by replacing the core of Neumuller et al in view of Joo et al. with the split core of Spreen, for the purpose of providing the device with a core that has a high common and differential mode inductance.

32. Claims 19, 21 & 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Parton as applied to claims 15 & 16 above, and further in view of Elliott, Rod.

"Transformers - The Basics Section 1." Beginner's Guide to Transformers 24 Mar 2001 April 2006 <<http://sound.westhost.com/xfmr.htm>>. (Elliott).

33. With regard to Claims 19 & 21, Parton teaches the device according to claims 15 & 16.

Elliott, in Figure 1.2, teaches a transformer core wherein the center leg is double the width of the outer legs (page 6 paragraph 7).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Parton with Elliott, by replacing the cores (11A & 12A) of Parton with the core of Elliot, for the purpose of saving space thus making the device more compact and space saving.

34. With regard to Claim 22, Parton teaches the device according to 16 wherein the central core area is determined substantially in accordance with the following relationships:  $2\Phi_1 = \Phi_2 + \Phi_3$  and  $\Phi$  is a magnetic flux in each limb in Webber, and wherein a subscript 1 represents the core and subscripts 2 and 3 represent the arms in indicated by the direction of the flow of flux  $\Phi A_1$  and  $\Phi A_2$  in Figure 4.

Parton does not explicitly teach that the core is determined in accordance with the following equation: and  $B_1 A_1 = B_2 A_2 + B_3 A_3$  wherein B is a magnetic flux density in each limb in Tesla, A is a cross sectional area of each limb in meters squared.

Elliott, in Figure 1.2, teaches a core wherein the center leg is double the width of the outer legs. The core Figure 1.2 would have an area equal to the sum of the out legs as Elliot discloses that the center leg is double the width of the outer legs in order to maintain the cross sectional area. It thus follows that because the center core is made from the same material as the outer legs that the flux density of the center legs would be the sum of the flux density of the two outer legs.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Parton with Elliott, by replacing the

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core of Parton with Elliott, for the purpose of saving space making the device more compact.

35. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Parton (US 4,045,823) in view of Spreen (US 5,115,676).

36. With regard to Claim 28, Parton teaches a series of multi-phase DC saturated superconducting current limiter devices, comprising a plurality of iron cores (12 & 13) wherein at least one of the plurality of iron cores includes at least one air-gap.

Parton does not teach that at least one of a plurality of iron cores includes a continuous iron core.

Spreen, in table 1 teaches different iron cores that include an air-gap and a continuous iron core.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Parton with Spreen, by replacing one of the iron cores of Parton with the ungapped iron core of Spreen, for the purpose of providing an over-current protection for a device wherein one phase of a load would require common mode DC current and another phase of the load would require no common mode DC current.

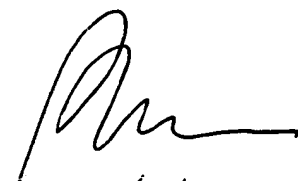
**Conclusion**

37. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott Bauer whose telephone number is 571-272-5986. The examiner can normally be reached on M-F 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Sircus can be reached on 571-272-2058. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SAB  
24 Apr 06



5/1/06

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